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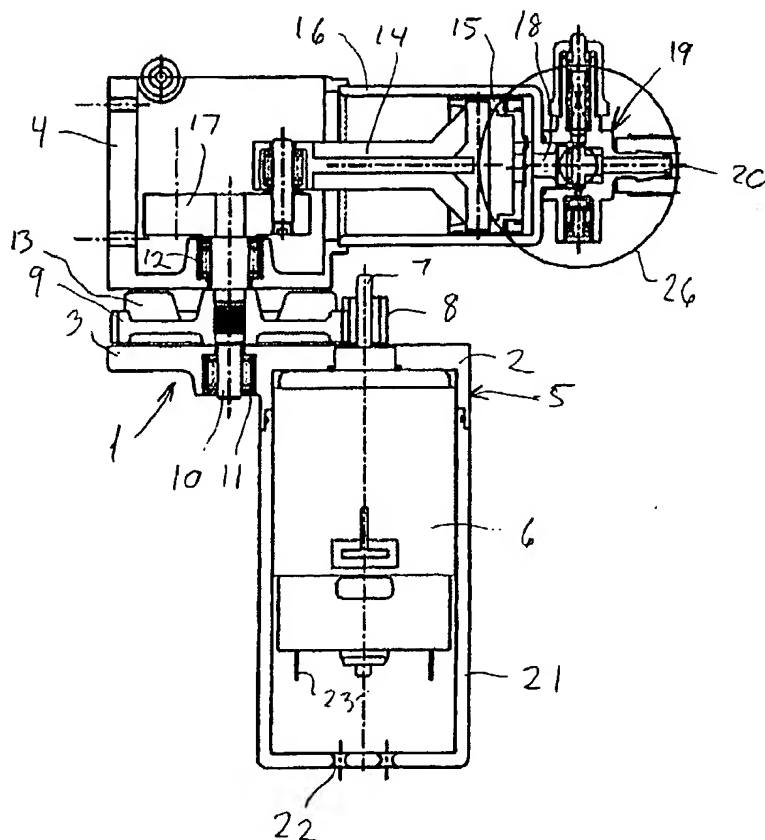
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(54) Title: AIR COMPRESSOR UNIT



(57) Abstract: A compressor unit for fixed installation in cars or for use in a separate unit for inflating and possible repairing punctured tyres comprises a conventional piston compressor (16) with crankshaft (10) driven by a 12V DC motor (6). Crankcase (4), gear housing (3) and flange (2) for mounting the motor (6) in the unit are cast in one piece. The compressor cylinder has laterally projecting lugs with screw holes and is releasably fastened to the crankcase with screw connections. The cylinder (16) is provided with a detachable valve arrangement (19) at the end opposite the crankcase. Thereby it is possible to exchange the cylinder (16) for use in different applications as stroke, cylinder diameter and dead volume in the top of the compressor cylinder may be varied according to choice for adapting piston displacement, discharge pressure and volume flow.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## Air Compressor Unit

### Background of the Invention

The present invention concerns an air compressor unit for inflating vehicle tyres, including a 12 V DC motor driving a reciprocating compressor through a crankshaft and  
5 a connecting rod arrangement and a gear with a gear ratio with crankshaft rpm relative to drive shaft rpm in the range 3:10 to 1:10 inserted between the drive shaft of the motor and the crankshaft.

Such a compressor unit is disclosed in GB A 2 157 775, providing a low-cost unit with  
10 only one piston and a gear with only one step.

### Summary of the Invention

The peculiar feature according to the invention is that crankcase, gear housing and flange for mounting the motor in the unit are cast in one piece, that the compressor  
15 cylinder has laterally projecting lugs with screw holes and is releasably fastened to the crankcase with screw connections, and that the cylinder is provided with a detachable valve arrangement at the end opposite the crankcase.

With these features is achieved a simple and cheap embodiment of a compressor unit  
20 for inflating tyres, and at the same time it is possible to exchange the cylinder for use in different applications since stroke, cylinder diameter and dead volume in the top of the compressor cylinder may be varied according to choice, thereby adapting piston displacement, discharge pressure and volume flow.

In order to enable use of different protective jackets on the motor for different IP protection degrees, it is preferred that the flange for mounting the motor covers the end  
25 face around the drive shaft and has an annular collar enclosing the abutting end of the motor, and that the collar is provided with mounting holes for fastening a jacket protecting the motor.

30

### The Drawing

Preferred embodiments of the invention will now be described in more detail with reference to the drawing, in which:

Fig. 1 shows a section through a first embodiment of a compressor unit according to the invention where the motor is provided with a protective jacket,

Fig. 2 shows a second embodiment of a compressor unit according to the invention as seen from the side without protective jacket, but mounted with a pressurised air hose, and

Fig. 3 shows the unit on Fig. 2 but seen from the right and provided with protective jacket.

### Description of Embodiments

As shown in the sectional drawing on Fig. 1, an embodiment of a compressor unit according to the invention is structured around a housing 1 comprising a collar 5 which is provided with a motor flange 2, a gearbox 3 or similar means and a crankcase 4. The collar 5 encloses one end of a 12 volt DC motor 6. The drive shaft 7 of the motor is provided with a small gear wheel 8 driving a larger gear wheel 9 on the crankshaft 10. The shaft 10 is suspended in bearings 11 and 12 in gearbox 3 and crankcase 4.

The larger gear wheel 9 may be provided with wings 13 for cooling the inner of the crankcase 4. In a way to the skilled in the art, the shaft 10 is provided with a crank and a connecting rod 14 pivotably connected thereto and having a piston 15 to be reciprocated in a cylinder 16. The shaft 10 is furthermore provided with a balance weight 17 opposite the crank for balancing the rotational movement.

The end of the cylinder 16 opposite the crankcase 4 is provided with a valve arrangement 19 over the air duct 18 of the cylinder, and with air intake with check valve, pressure gauge 26, and air discharge outlet 20.

The motor 6 is here enclosed by a jacket 21 fitting tightly to the collar 5 of the motor flange 2 and mounted via screw holes on laterally projecting lugs 30 as shown on Fig. 3. The jacket 21 is furthermore provided with holes 22 for passing through not shown wiring for the terminals 23 of the motor. The function of the jacket 21 is to provide a selected IP sealing relative to the environment in which the motor 6 is to operate. The

motor 6 is fastened to the flange 2 by not shown screws, and the jacket 21 is fastened to the collar 5 with not shown screws through the projections 30.

5 The gear ratio measured as the tooth number of the small wheel 8 compared with the tooth number of the large wheel 9 is here in the magnitude 1:5 but other ratios may of course be chosen according to the need.

10 The cylinder 16 is detachable as it is fastened to the crankcase 4 with not shown screws through not shown laterally projecting lugs which are shaped like the lugs 30 on the collar 5. Thereby the displacement and other parameters in connection with the pressurised air supply may be changed.

15 In the embodiment shown, the wheel 9, the connecting rod 14 and the cylinder 15 together with the valve arrangement 19 are made of plastic, whereas most of the other constituent parts are made of metal, preferably steel, aluminium or zinc alloys.

20 In another embodiment as shown on Fig. 2 and 3, many components are identical with those on Fig. 1. The motor 6 on Fig. 2, however, is shown without any protective jacket. Furthermore, a valve arrangement with a slightly different external shape is used at the top of the cylinder 16. Thus there is provided a pressure gauge 26, a pressure switch 25, and a rubber hose 27 connected to the outlet 20. On the hose 27 there is a button operated valve 28 and a car tyre connector 29.

25 Other embodiments of the invention are possible. Another form of cylinder 16 may thus be used, shaped almost tubular, where the valve arrangement 19 constitutes a cylinder head projecting beyond the side of the cylinder, and where long screws are applied through holes in the cylinder head at the outer side of the cylinder and which are screwed into the crankcase 4 for holding the cylinder fast between crankcase and cylinder head.

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In both embodiments, the compressor unit is designed be mass-produced of standard component parts. The compressor unit according to the invention may be applied by installation in cars where the unit is associated with a device for injecting latex mass,

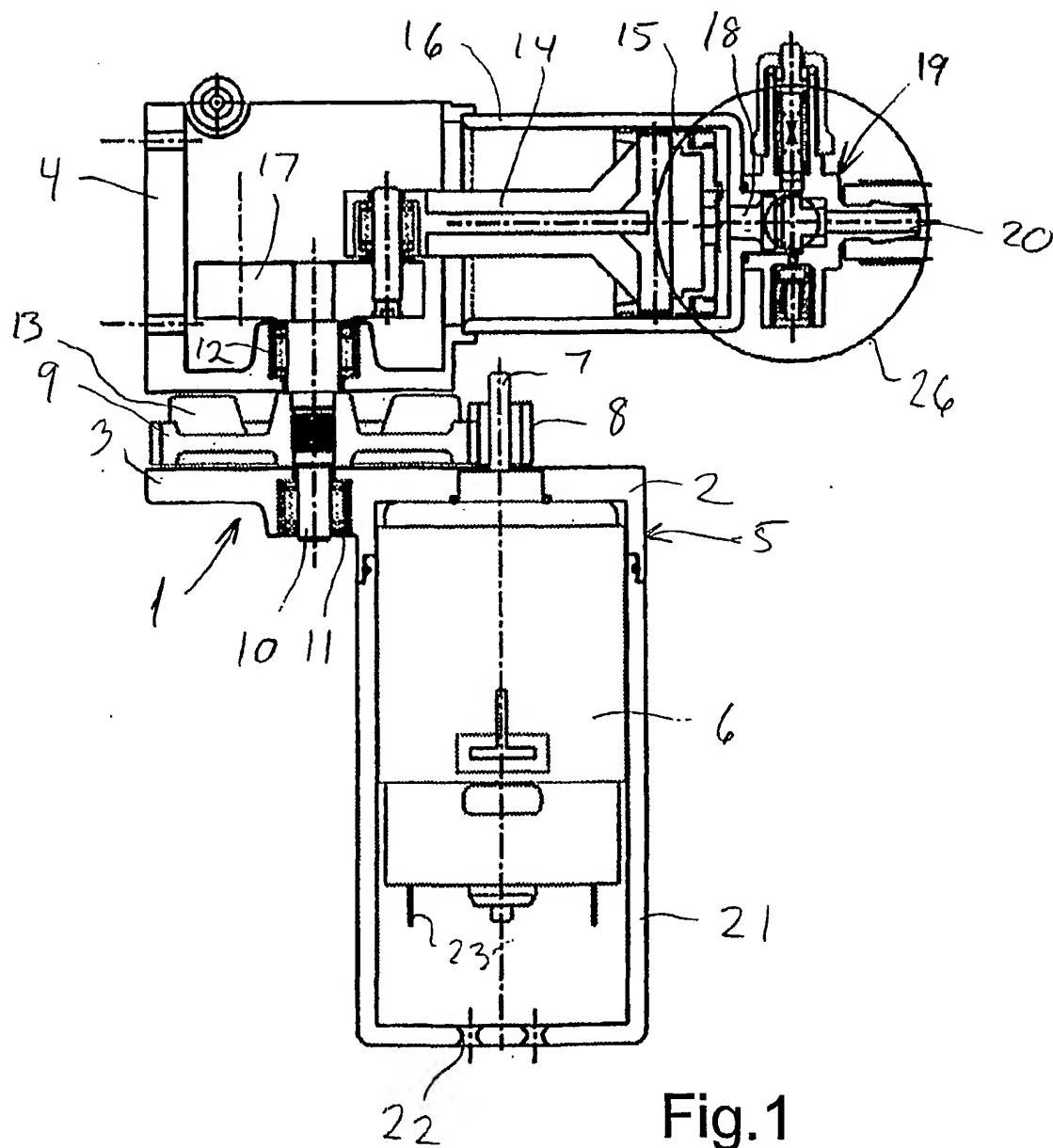
where the pressurised air is used for pressing the latex mass into a punctured tyre on the car after which the compressor may provide the tyre with pressurised air until inflated completely. Another application may be in a separate unit provided in a box or in another easily handled means and may have its own energy supply in the shape of a battery.

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## CLAIMS

1. An air compressor unit for inflating vehicle tyres, including a 12 V DC motor (6) driving a reciprocating compressor through a crankshaft (10) and a connecting rod arrangement (14), where a gear (8,9) with a gear ratio of crankshaft rpm relative to drive shaft rpm in the range 3:10 to 1:10 is inserted between the drive shaft (7) of the motor (6) and the crankshaft (10), **characterised** in that crankcase (4), gear housing (3) and flange (2) for mounting the motor (6) in the unit are cast in one piece, that the compressor cylinder (16) has laterally projecting lugs with screw holes and is releasably fastened to the crankcase (4) with screw connections, and that the cylinder (16) is provided with a detachable valve arrangement (19) at the end opposite the crankcase (4).
2. A compressor unit according to claim 1, **characterised** in that the flange (2) for mounting the motor (6) covers the end face around the drive shaft (7) and has an annular collar (5) enclosing the abutting end of the motor (6), and that the collar (5) is provided with mounting holes for fastening a jacket (21) protecting the motor (6).

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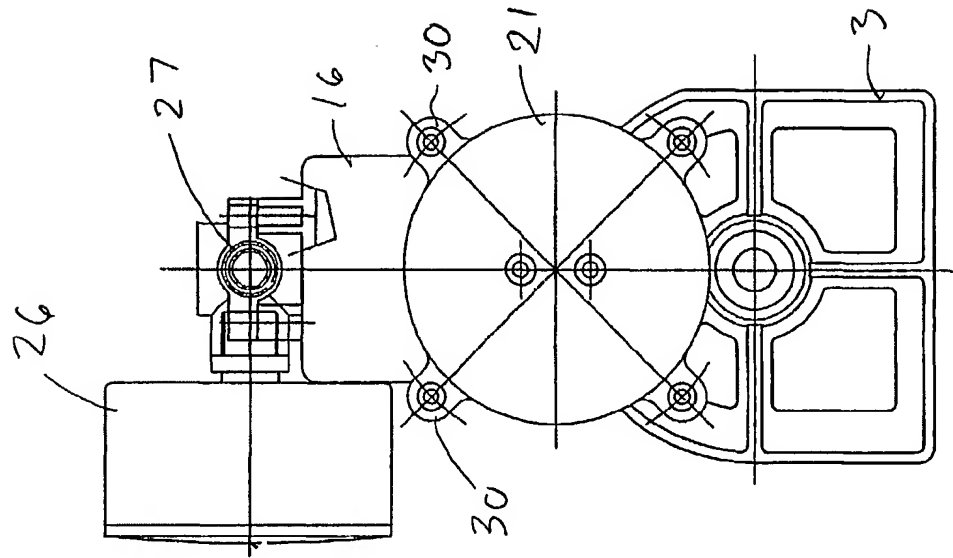


Fig.3

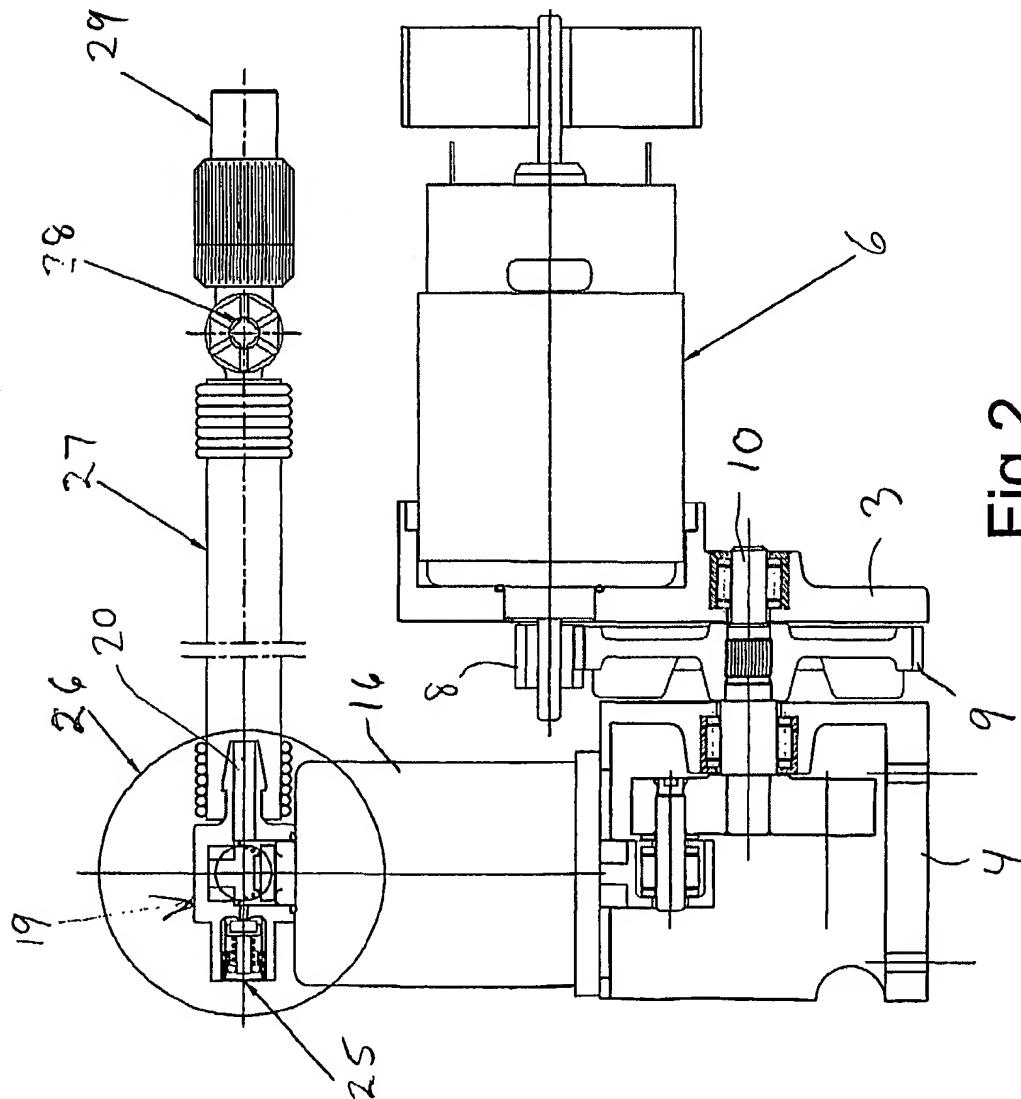


Fig.2

## INTERNATIONAL SEARCH REPORT

International application No.

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## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F04B 35/04, B60S 5/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F04B, B60S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 1470548 A (G.J. SPOHRER), 9 October 1923 (09.10.23), page 1, line 99 - line 100; page 2, line 1 - line 41, figure 1 --	1-2
X	US 4187058 A (FISH), 5 February 1980 (05.02.80), column 2, line 34 - line 38, figure 2 --	1-2
X	GB 2277966 A (WEN SAN JOU), 16 November 1994 (16.11.94), page 3, figures 1-2 --	1-2
A	GB 2039620 A (HANNING ELEKTRO-WERKE GMBH & CO.), 13 August 1980 (13.08.80), page 1, line 115 - line 125, figure 1 --	1-2

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

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"&amp;" document member of the same patent family

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Information on patent family members

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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
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